

In the Claims:



Please amend claims 4, 5, 11-14, 18 and 19, cancel claims 1-3, 6-10, 15-17, 20 and 21, and add claims 22-51, as indicated below.

1. – 3. (Canceled)

4. (Currently Amended) ~~The method of data redundancy as described in Claim 2, further comprising:~~ A method for data redundancy in a data storage system, comprising:

a) grouping a plurality of disk drives into a plurality of arrays having data redundancy to optimize performance, and

b) for every failure of one of said plurality of arrays due to a failed disk drive, dynamically creating a new array having data redundancy in said plurality of arrays and that is optimized for performance, said new array containing information from said failed disk drive; wherein b) comprises:

b1) upon failure of a first array in said plurality of arrays due to said first failed disk drive, dynamically choosing a second array in said plurality of arrays that has the smallest number of disk drives as between the remaining arrays, said second array having redundancy;

b2) combining disk drives from said first array, excluding said first failed disk drive, with disk drives from said second array to dynamically form said new array in a RAID configuration having data redundancy in said plurality of arrays; and

configuring said new array in a RAID-4 configuration.

5. (Currently Amended) ~~The method of data redundancy as described in Claim 2,~~
further comprising A method for data redundancy in a data storage system, comprising:

a) grouping a plurality of disk drives into a plurality of arrays having data redundancy to optimize performance, and

b) for every failure of one of said plurality of arrays due to a failed disk drive, dynamically creating a new array having data redundancy in said plurality of arrays and that is optimized for performance, said new array containing information from said failed disk drive; wherein b) comprises:

b1) upon failure of a first array in said plurality of arrays due to said first failed disk drive, dynamically choosing a second array in said plurality of arrays that has the smallest number of disk drives as between the remaining arrays, said second array having redundancy;

b2) combining disk drives from said first array, excluding said first failed disk drive, with disk drives from said second array to dynamically form said new array in a RAID configuration having data redundancy in said plurality of arrays; and

configuring said new array in a RAID 5 configuration.

6. – 10. (Canceled)

11. (Currently Amended) ~~The method for data redundancy as described in Claim 8,~~
A method for data redundancy in a data storage system, comprising:

a) grouping a plurality of disk drives into a plurality of arrays having data redundancy to optimize performance, including a first and second array;

b) upon failure of said first array due to a first failed disk drive, dynamically combining disk drives from said first array, excluding said first failed disk drive, with disk drives from said second array to form a first new array having data redundancy in said plurality of arrays; wherein b) comprises

b1) if a first mirrored pair is available, choosing said first mirrored pair to be said second array;

b2) if no arrays of mirrored pairs of disk drives are present in said plurality of arrays, choosing an array having redundancy that has the next smallest number of disk drives to be said second array; and

b3) combining disk drives from said first array with disk drives from said second array to form said first new array in a RAID configuration having data redundancy in said plurality of arrays.

12. (Currently Amended) ~~The method for data redundancy as described in Claim 8, further comprising:~~ A method for data redundancy in a data storage system, comprising:

a) grouping a plurality of disk drives into a plurality of arrays having data redundancy to optimize performance, including a first and second array;

b) upon failure of said first array due to a first failed disk drive, dynamically combining disk drives from said first array, excluding said first failed disk drive, with disk drives from said second array to form a first new array having data redundancy in said plurality of arrays;

- c) upon failure of said first new array due to a second failed disk drive, if a first mirrored pair is available, choosing said mirrored pair to be a third array in said plurality of arrays;
- d) if no arrays of mirrored pairs of disk drives are present, choosing an array having redundancy that has the smallest number of disk drives to be said third array; and
- e) upon failure of said first new array, combining disk drives from said first new array, not including said second failed disk drive, with disk drives from said third array, to form a second new array in a RAID configuration having data redundancy in said plurality of arrays.

13. (Currently Amended) The method for data redundancy as described in Claim 12, further comprising:

- [[c)]]f) upon failure of said second new array due to a third failed disk drive, if a second mirrored pair is available, choosing said second mirrored pair to be a fourth array in said plurality of arrays;
- [[d)]]g) if no arrays of mirrored pairs of disk drives are present, choosing an array having redundancy that has the smallest number of disk drives to be said fourth array; and
- [[e)]]h) combining disk drives from said second new array, not including said third failed disk drive, with disk drives from said fourth array, to form a third new array in a RAID configuration having data redundancy in said plurality of arrays.

14. (Currently Amended) ~~The method of data redundancy as described in Claim 8-A~~ a method for data redundancy in a data storage system, comprising:

- a) grouping a plurality of disk drives into a plurality of arrays having data redundancy to optimize performance, including a first and second array;
- b) upon failure of said first array due to a first failed disk drive, dynamically combining disk drives from said first array, excluding said first failed disk drive, with disk drives from said second array to form a first new array having data redundancy in said plurality of arrays;
- c) upon failure of a third array due to a second failed disk drive, if a first mirrored pair is available, choosing said first mirrored pair to be a fourth array in said plurality of arrays;
- d) if no arrays or mirrored pairs of disk drives are present, choosing an array having redundancy that has the smallest number of disk drives to be said fourth array; and
- e) dynamically combining disk drives from said third array, not including said second failed disk drive, with disk drives from said fourth array to form a second new array in a RAID configuration having data redundancy in said plurality of arrays.

15. – 17. (Canceled)

18. (Currently Amended) ~~The data storage system as described in Claim 16, wherein said method further comprises:~~ A data storage system, comprising:

a plurality of disk drives comprising spare disks; and

an array controller comprising a processor, and a memory wherein said memory contains instructions that when executed implement a method comprising:

a) grouping a plurality of disk drives into a plurality of arrays having data redundancy to optimize performance, and

b) for every failure of one of said plurality of arrays due to a failed disk drive, dynamically creating a new array having data redundancy in said plurality of arrays and that is optimized for performance, said new array containing information from said failed disk drive; wherein b) comprises:

b1) upon failure of a first array in said plurality of arrays due to said first failed disk drive, dynamically choosing a second array in said plurality of arrays that has the smallest number of disk drives as between the remaining arrays, said second array having redundancy;

b2) combining disk drives from said first array, excluding said first failed disk drive, with disk drives from said second array to dynamically form said new array in a RAID configuration having data redundancy in said plurality of arrays; and

configuring said new array in a RAID-4 configuration.

19. (Currently Amended) ~~The data storage system as described in Claim 16, wherein said method further comprises:~~ A data storage system, comprising:

a plurality of disk drives comprising spare disks; and

an array controller comprising a processor, and a memory wherein said memory contains instructions that when executed implement a method comprising:

a) grouping a plurality of disk drives into a plurality of arrays having data redundancy to optimize performance, and

b) for every failure of one of said plurality of arrays due to a failed disk drive, dynamically creating a new array having data redundancy in said plurality of arrays and that is optimized for performance, said new array containing information from said failed disk drive; wherein b) comprises:

b1) upon failure of a first array in said plurality of arrays due to said first failed disk drive, dynamically choosing a second array in said plurality of arrays that has the smallest number of disk drives as between the remaining arrays, said second array having redundancy;

b2) combining disk drives from said first array, excluding said first failed disk drive, with disk drives from said second array to dynamically form said new array in a RAID configuration having data redundancy in said plurality of arrays; and

configuring said new array in a RAID-5 configuration.

20. – 21. (Canceled)

22. (New) A method, comprising:

grouping a plurality of disk drives into a plurality of arrays, each comprising a plurality of disk drives, and each array providing data redundancy within the respective array;

detecting a failure of a disk drive in one array of the plurality of arrays; and

in response to said detecting a failure, combining said one array with another array of the plurality of arrays into a new array comprising all non-failed disk drives of the two combined arrays.

23. (New) The method of claim 22, wherein said another array comprises the smallest number of disk drives of any of the plurality of arrays, excepting said one array in which a failure was detected.

24. (New) The method of claim 22, wherein said combining comprises configuring the new array as a RAID device.

25. (New) The method of claim 24, wherein the RAID device is a RAID-4 device.

26. (New) The method of claim 24, wherein the RAID device is a RAID-5 device.

27. (New) The method of claim 22, wherein said grouping comprises maximizing the number of arrays of the plurality of arrays that comprise mirrored pairs of disk drives.

28. (New) The method of claim 22, wherein said grouping comprises maximizing the number of arrays of the plurality of arrays that are configured as RAID devices including three disk drives.

29. (New) The method of claim 22, wherein said grouping comprises a combination of at least two of: arrays of mirrored pairs of disk drives, arrays in a RAID configuration of three disk drives and arrays in a RAID configuration having more than three disk drives.

30. (New) The method of claim 22, wherein said combined arrays both comprised mirrored pairs of disk drives prior to said combining, and wherein said new array is configured as a RAID device.

31. (New) The method of claim 22, wherein said one array comprises a mirrored pair of disk drives, wherein said another array is configured as a RAID device, and wherein the new array is configured as a RAID device.

32. (New) A system, comprising:

a plurality of disk drives; and

an array controller, wherein the array controller comprises:

a processor; and

a memory coupled to the processor, wherein the memory comprises program instructions configured to implement:

grouping the plurality of disk drives into a plurality of arrays, each comprising a plurality of disk drives, and each array providing data redundancy within the respective array;

detecting a failure of a disk drive in one array of the plurality of arrays; and

in response to said detecting a failure, combining said one array with another array of the plurality of arrays into a new array comprising all non-failed disk drives of the two combined arrays.

33. (New) The system of claim 32, wherein said another array comprises the smallest number of disk drives of any of the plurality of arrays, excepting said one array in which a failure was detected.

34. (New) The system of claim 32, wherein as part of said combining, the program instructions are configured to configure the new array as a RAID device.

35. (New) The system of claim 34, wherein the RAID device is a RAID-4 device.

36. (New) The system of claim 34, wherein the RAID device is a RAID-5 device.

37. (New) The system of claim 32, wherein as part of said grouping, the program instructions are configured to maximize the number of arrays of the plurality of arrays that comprise mirrored pairs of disk drives.

38. (New) The system of claim 32, wherein as part of said grouping, the program instructions are configured to maximize the number of arrays of the plurality of arrays that are configured as RAID devices including three disk drives.

39. (New) The system of claim 32, wherein as part of said grouping, the program instructions are configured to include in the plurality of arrays at least two of: arrays of mirrored pairs of disk drives, arrays in a RAID configuration of three disk drives and arrays in a RAID configuration having more than three disk drives.

40. (New) The system of claim 32, wherein said combined arrays both comprise mirrored pairs of disk drives, and wherein the new array is configured as a RAID device.

41. (New) The system of claim 32, wherein said one array comprises a mirrored pair of disk drives, wherein said another array is configured as a RAID device, and

wherein the new array is configured as a RAID device.

42. (New) A computer accessible medium comprising program instructions configured to implement:

grouping a plurality of disk drives into a plurality of arrays, each comprising a plurality of disk drives, and each array providing data redundancy within the respective array;

detecting a failure of a disk drive in one array of the plurality of arrays; and

in response to said detecting a failure, combining said one array with another array of the plurality of arrays into a new array comprising all non-failed disk drives of the two combined arrays.

43. (New) The computer accessible medium of claim 42, wherein said another array comprises the smallest number of disk drives of any of the plurality of arrays, excepting said one array in which a failure was detected.

44. (New) The computer accessible medium of claim 42, wherein said combining comprises configuring the new array as a RAID device.

45. (New) The computer accessible medium of claim 44, wherein the RAID device is a RAID-4 device.

46. (New) The computer accessible medium of claim 44, wherein the RAID device is a RAID-5 device.

47. (New) The computer accessible medium of claim 42, wherein as part of said grouping, the program instructions are configured to implement maximizing the number of arrays of the plurality of arrays that comprise mirrored pairs of disk drives.

48. (New) The computer accessible medium of claim 42, wherein as part of said grouping, the program instructions are configured to implement maximizing the number of arrays of the plurality of arrays that are configured as RAID devices including three disk drives.

49. (New) The computer accessible medium of claim 42, wherein as part of said grouping, the program instructions are configured to implement including in the plurality of arrays at least two of: arrays of mirrored pairs of disk drives, arrays in a RAID configuration of three disk drives and arrays in a RAID configuration having more than three disk drives.

50. (New) The computer accessible medium of claim 42, wherein said combined arrays both comprise mirrored pairs of disk drives, and wherein the new array is configured as a RAID device.

51. (New) The computer accessible medium of claim 42, wherein said one array comprises a mirrored pair of disk drives, wherein said another array is configured as a RAID device, and wherein the new array is configured as a RAID device.